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Innovative technologies for autism: critical reflections on digital bubbles

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Abstract

There is increasing interest from researchers, teachers and other professionals, individuals with autism, and families about the potential for innovative technologies to transform learning experiences and facilitate friendships and social networks. Media accounts have highlighted both the apparently miraculous impacts of technology on supporting communication and learning for people with autism, as well as significant concerns about whether technology use is healthy, safe and socially appropriate for children and young people. Rarely, however, is any evidence reported to support either set of claims. This short paper reports on an ESRC-funded seminar series in the UK that is critically reviewing and discussing the field with respect to the research evidence base but also the assumptions that are made about where, how and whether innovative technologies may be useful for people with autism and their families. The first seminar in the series focused on whether technologies create a social bubble for people with autism and presented research demonstrating that technology use can be positive, supportive and rewarding.

Introduction

Media headlines have raised concerns about children's use of personal technologies including tablet PCs, smartphones and games, e.g. '*The five signs your child is addicted to their iPad - and how to give them a 'digital detox*" (Mail Online, 30th October 2013). Similar concerns were raised when researchers started to investigate the potential of technologies for supporting the learning of children on the autism spectrum, suggesting that there was a danger of children becoming addicted (Howlin, 1998) and '…reluctant to re-enter the real world' (Latash, 1998; p.105). Thus, the accusation – then and now - is that technologies create 'digital bubbles' that surround the user, such that the child is then less engaged with the 'real world', with potentially detrimental effects. For children on the autism spectrum who are diagnosed according to the existence of profound social and communication difficulties, the implied accusation is even stronger: that by using technologies for supporting learning we are somehow 'colluding' with children's disability (cf. Parsons & Mitchell, 2002).

However, proponents of technology use for children on the autism spectrum highlight a natural affinity with technologies that can support learning and social interactions (Durkin, 2010; Mineo et al., 2009). In addition, cognitive strengths in systemizing make technology attractive and motivating for people with autism (Baron-Cohen, 2002), and technology-based support has allowed people with autism to engage socially in ways that would otherwise not be possible (Benford & Standen, 2009; Stendal et al., 2011). Reflecting these potentially facilitative effects of technology, there has been a surge of research interest in the past decade into the use of technologies for supporting people with autism, with the number of published papers increasing four-fold between 2001 and 2012 (Ploog et al., 2013). Notably, the use of technology by people on the autism spectrum has extended significantly beyond the idea of technology as an assistive or augmentative device. Specifically, the 'neurodiversity' movement has developed entirely online, and primarily comprises autistic self-advocates who propose, support and defend the value and importance of an autistic identity (Kapp et al., 2013). Thus, for some, the 'digital bubble' that is created through online interaction is essential and positive, enabling and

empowering 'voice' and advocacy in ways that would not have been possible without it (Davidson, 2008; Blume, 1997). However, despite the growth in research in this area, there are also many claims that appear in the media, usually unsupported by research evidence, about the positive (sometimes miraculous) impacts of technology in ASC, creating a sense of 'mythical practices that are not empirically based' (Knight et al., 2013; p.2629).

The 'digital bubbles' seminar series

Given these highly contrasting messages, we proposed a seminar series to the Economic and Social Research Council (ESRC) to explore and critically reflect on the idea of 'digital bubbles' relating to the development, application and investigation of technology use for, and by, children, young people and adults on the autism spectrum. We wanted to know what the current evidence base reveals about technology use, as well as look to the future to frame important research questions for exploration. In addition, we wanted to challenge the existing tendency in the field for researchers to work within their own 'bubbles' that are often technology, discipline and / or autism specific. The field is limited generally by a lack of communication between the different academic disciplines involved (e.g. Psychology, Education, Computer Science, Engineering); and between academics and the 'user community' (Pellicano et al., 2013; Parsons et al., 2009). There is also a tendency for researchers to focus only on autism research, or a small part of the age range of children on the spectrum (e.g. Edwards et al., 2012), or more able children, and so there is limited consideration of the wider research field, which could provide useful cross-fertilization, application and extension of ideas and knowledge. We suggest there are a number of 'bubbles' that exist in this research field that can usefully be explored to gain an in-depth understanding of the state-of-the-art as well as inform future research agendas; these form the basis of the series and are summarised in Figure 1. The following section provides an overview of the talks from the first seminar, along with some key messages from the discussion on the day.

Insert Figure 1 about here

Seminar 1: The social bubble

The first seminar in the series took place at the University of Southampton in November 2014 and focused on the social affordances of technology use. Speakers explored whether technologies create a social bubble and, if so, do they increase social isolation, or provide helpful ways of engaging with other people in a remote way? Moreover, if society is increasingly operating within digital social bubbles, could it be that society itself is becoming more autism-friendly? Speakers offered different perspectives on these questions; their slides as well as short video abstracts are available from the seminar series website: http://digitalbubbles.org.uk/ . Materials from future seminars will also be made available on the website.

To begin, Andrew Monaghan – CEO of Autism Hampshire – talked about the importance of the impact of technology on the people with autism who access services, and asked whether technologies present a challenge or opportunity for them? Andrew handed over to Barnabear who provided some insights into this question from the perspective of someone with Asperger Syndrome. Barnabear (2014) discussed how technology could be a: barrier, bridge, buffer or filter for people with an autism spectrum condition, providing examples from everyday life. For example, he described his mother only wanting to use a mobile phone for making emergency calls but whose mobile phone provider changed her contract via text message and 'took her lack of reply as tacit agreement' (p.2). She did not read or want text messages and so this was an example where 'text became a barrier to her accessing voice. One technology defeating another' (p.2).

Barnabear then discussed how technologies can be bridges that overcome barriers, for example using text-to-speech apps that can help people to communicate. He highlighted the value of technology being a buffer by providing a 'temporal decoupling so that information doesn't have to be processed in real time' (p.6), for example self-paced online learning. Finally, he talked about technology as a filter that can help to narrow down communication / information to key

parts while removing extraneous noise, giving the example of a GPS navigation system that 'trickle feeds me just the right information in real time' (p.7). Summing up across these four categories, he posed an important question: 'What problem would you want solved and what would you invent?' (p.9). In other words, what technologies need to be invented to support people with autism to understand, navigate and interact in the world comfortably and effectively?

Connecting with Barnabear's idea of technologies as bridges to interaction, Nicola Yuill from the University of Sussex drew upon her research to illustrate the effectiveness of using collaborative technologies for initiating and supporting social communication for children with autism (e.g. Yuill et al., 2014; Holt & Yuill, 2014). One of her interesting conclusions was that it may actually be better to encourage children to share the use of PCs / tablets in schools in order to encourage joint attention and collaboration while working together on tasks (Yuill, Rogers & Rick, 2013). Kevin Durkin from the University of Strathclyde systematically unpicked some of the assumptions, negative stereotypes and media panics around children's use of computer games based on evidence from his own research (e.g. Conti-Ramsden, Durkin & Walker, 2010; Durkin, 2010; Durkin & Barber, 2002; Lawrence et al., 2002). Linking with Barnabear's suggestion of technology as bridges and filters, Kevin highlighted that children's use of computer-based games is just another way of playing, and that play is a vital component of children's development, whether this takes place in the real or digital world

Mark Brosnan's talk connected with Barnabear's idea of technology as a buffer and a filter. Mark, from the University of Bath, has researched the use of Facebook by people with ASD to explore whether being able to slow down online interactions (e.g. when communication is asynchronous), and filter out extraneous cues, facilitates communication. People with ASD were similar to a control group in their expressions of empathy and emotion when using specific Facebook groups, and many respondents with ASD reported that they found communication easier online compared to face-to-face (Brosnan & Gavin, 2015). Finally, Judith Good, from the

University of Sussex challenged us to consider the outdated distinction that we as researchers, but also the general public, tend to make between the 'real' and the 'virtual' world. Judith emphasised the dramatic changes in the use of technologies in recent years, such that technologies are now an integrated part of everyday lives in the 'real' world. Judith drew upon her work on the ECHOES project (Frauenberger, Good, Alcorn & Pain, 2013) to illustrate how technology can function as a bridge to 'real world' interactions and can '…maximise opportunities for growth, interaction, learning and play in our 'real (digital) world'.

Key messages

Overall, the day was thought-provoking and engaging; the presentations encouraged us to question the often negative stereotypes or assumptions that exist about how people with autism use, and can benefit from, different technologies. Importantly, research evidence was also presented to support these positive claims. There was much discussion from the audience and we encouraged them to feedback thoughts and comments via post-it notes which were collected during the day. Main themes arising in these comments included considerations of whether there is only one right way to communicate; for example, similarities and differences between online and face-to-face communication were raised, alongside a debate about whether face-to-face communication should always be encouraged over online methods. Participants also discussed whether technology was a facilitator of, rather than replacement for, social interaction and highlighted that technology use and development needs to have meaningful impact for the users if it is to be useful:

> *'Learning activities (including technologies) need to be meaningful and salient in order to be transferable between contexts.'*

Crucially, one of the delegates also raised the following challenge to us:

> *'How do we disseminate these positive notions of the functions of technologies to the wider public / society, to dispel the notions/conceptions of 'technology=bad'?'*

We hope that this article, along with the series website and our blog about each of the seminars, will help in getting this message out more widely, however we need to continue to raise awareness about the evidence-based positive roles that technology can play in supporting communication and interactions. We also remain cognisant of the need to maintain a critical perspective on research agendas and outputs regarding the relevance and appropriateness of developing 'technologies for autism', as one of our participants reminded us:

> *'Whenever you're trying to develop technologies think about whether it will <u>really</u> improve someone's life – or do you just think it will?'*

The second seminar - the developmental bubble – took place at the University of Sussex in March 2015 and built on the key themes emerging from the first seminar, particularly about the relevance of technology to someone's life, with speakers addressing: how can developmental psychology inform understanding and intervention? Are aspects of development in autism best seen as delayed or different? If autism involves different development, maybe we should re-think how we intervene? The third seminar - the methodological bubble - took place at the University of Bath in July 2015 and continued to build a critical perspective on how research in this area is carried out, with a particular emphasis on the extent to which people on the autism spectrum are involved in the design, development and evaluation of the research. We hope to report in more detail on these seminars, as well as the later ones in the series, in due course.

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Figures

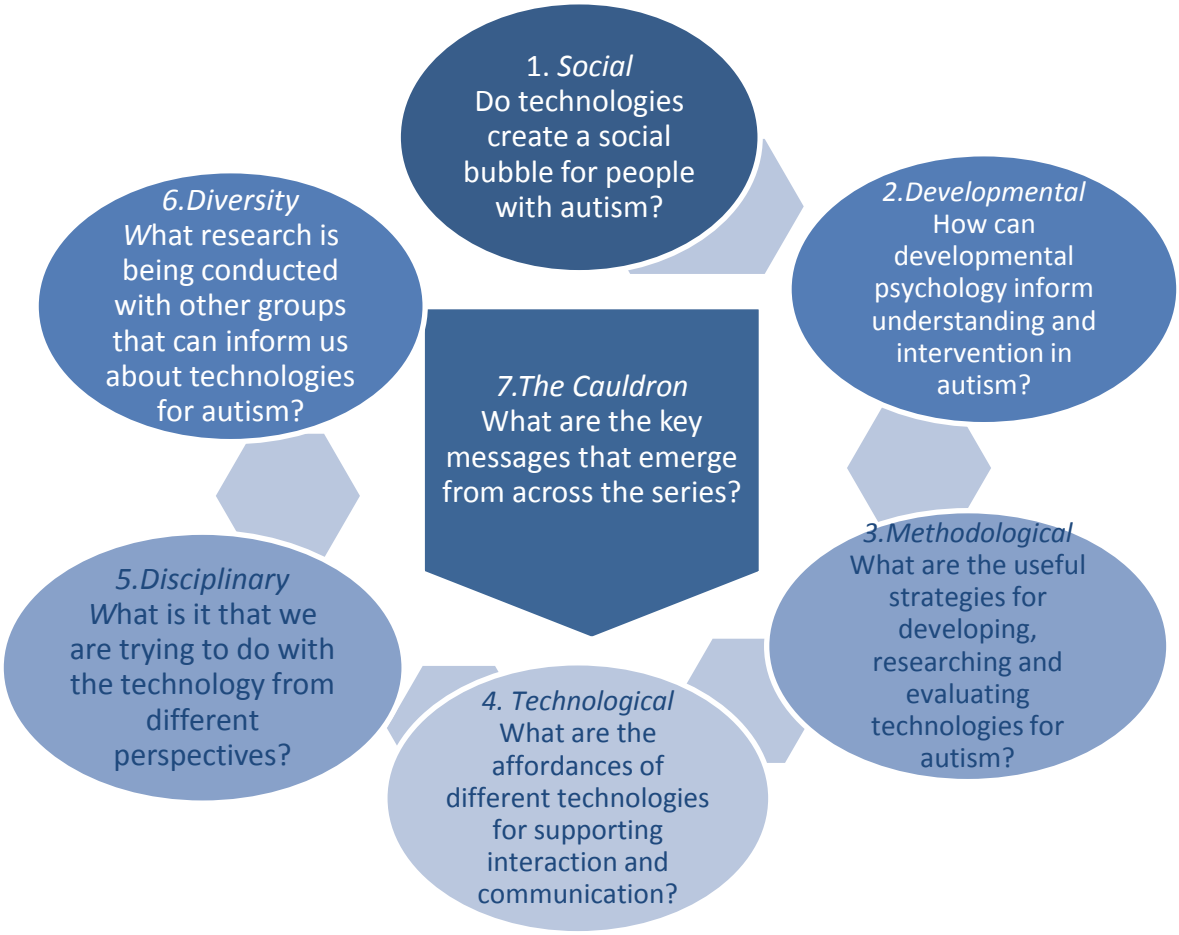

Figure 1: Summary of the seven seminars for the 'Digital Bubbles' series (2014-16)